PBS | Engineering + Environmental

January 6, 2016

Port of Kalama
Attn: Mr. Eric Yakovich
110 West Marine Drive
Kalama, WA 98625

Re: Focused Groundwater Investigation
Northwest of Former Longview Fibre, 1253 NW 3rd Street, Kalama Washington
Kalama, Washington
PBS Project No. 20215.003

Dear Mr. Yakovich:

PBS Engineering and Environmental Inc. (PBS) is pleased to present this letter report detailing a focused groundwater investigation at the above-referenced site. PBS understands that a stormwater infiltration system will be constructed northwest of the former Longview Fibre facility and south-southwest of the Kalama Chemical facility. Prior to construction, the Port of Kalama requested the shallow groundwater be assessed, given that both facilities have historically had groundwater contamination.

Drilling Activities

Prior to beginning work, a public utility clearance request was filed to locate all public utilities within the investigation area. A private utility locate was performed by Locates Down Under of Oregon City, Oregon, to clear each temporary boring of subsurface obstructions. A site-specific health and safety plan was prepared and reviewed with the drilling contractor prior to beginning site work.

On December 21, 2015, PBS supervised Pacific Soil and Water of Tigard, Oregon, while they performed drilling services. Two temporary boreholes were installed using a direct-push-type drill rig. Please see the attached Figure 2 for borehole locations. Boring B-1 was located to assess the historical septic drain field near the former Longview Fibre facility. Boring B-2 was located to assess potential migration of contaminated groundwater from the Kalama Chemical facility.

The borings were advanced to a depth of 15 feet below ground surface (bgs) and PBS collected groundwater samples from each boring following the PBS standard operating procedure (SOP) for sampling groundwater monitoring wells, modified as needed for temporary borings. A copy of the SOP is included in the attachments.

PBS logged the soils, making note of grain size, color, odor, and moisture; encountered soil was predominately gravel with silt to 4.5 feet below ground surface (bgs), underlain by sand from 4.5 to 9.5 feet bgs, with silt underlying the sand layer to the base of the boring at 15.0 feet bgs. There were no visual, olfactory, or handheld photoionization detector (PID) indications of contamination encountered. Groundwater was first encountered in both borings at 10 and 7 feet bgs, with a static water level of approximately 7.5 and 5.0 feet bgs in borings B-1 and B-2, respectively. A slight marshy odor was observed throughout the borings. The borings were backfilled with bentonite and patched to match the surrounding surface. Borehole logs are provided in the attachments.

4412 SW Corbett Avenue, Portland, OR 97239
503.248.1939 Main
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Groundwater Analytical Results

Groundwater samples were analyzed by TestAmerica Laboratories, Inc. of Tacoma, Washington, for petroleum hydrocarbons by Northwest Method Total Petroleum Hydrocarbons – Gasoline (NWTPH-Gx) and Diesel (NWTPH-Dx) as well as Volatile Organic Compounds (VOCs) by EPA Method 8260. Groundwater samples collected from the two borings (B-1 and B-2), contained no detectable petroleum hydrocarbon contamination or VOCs above laboratory reporting limits for any of the compounds analyzed. A full laboratory report with chain-of-custody documentation is provided as an attachment.

Conclusions

Petroleum hydrocarbons and VOCs were not detected in the two groundwater samples collected during this investigation. Groundwater at the proposed construction site does not appear to be impacted from the adjacent properties. Additional investigation is not warranted at this time.

Limitations

PBS has prepared this report for use exclusively by Port of Kalama (client) and is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced in total or in part without express written consent of the client and PBS.

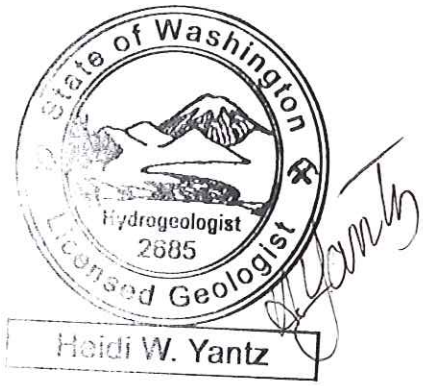
This study was limited to the tests, locations, and depths as indicated to determine the absence or presence of certain contaminants. The site as a whole may have other contamination that was not characterized by this study. The findings and conclusions of this report are not scientific certainties but, rather, probabilities based on professional judgment concerning the significance of the data gathered during the course of this investigation. PBS is not able to represent that the site or adjoining land contain no hazardous waste, oil, or other latent conditions beyond that detected or observed by PBS. Groundwater data collected from temporary borings is considered preliminary; detections may need confirmation by installation of permanent wells.

Sincerely,
PBS Engineering and Environmental Inc.

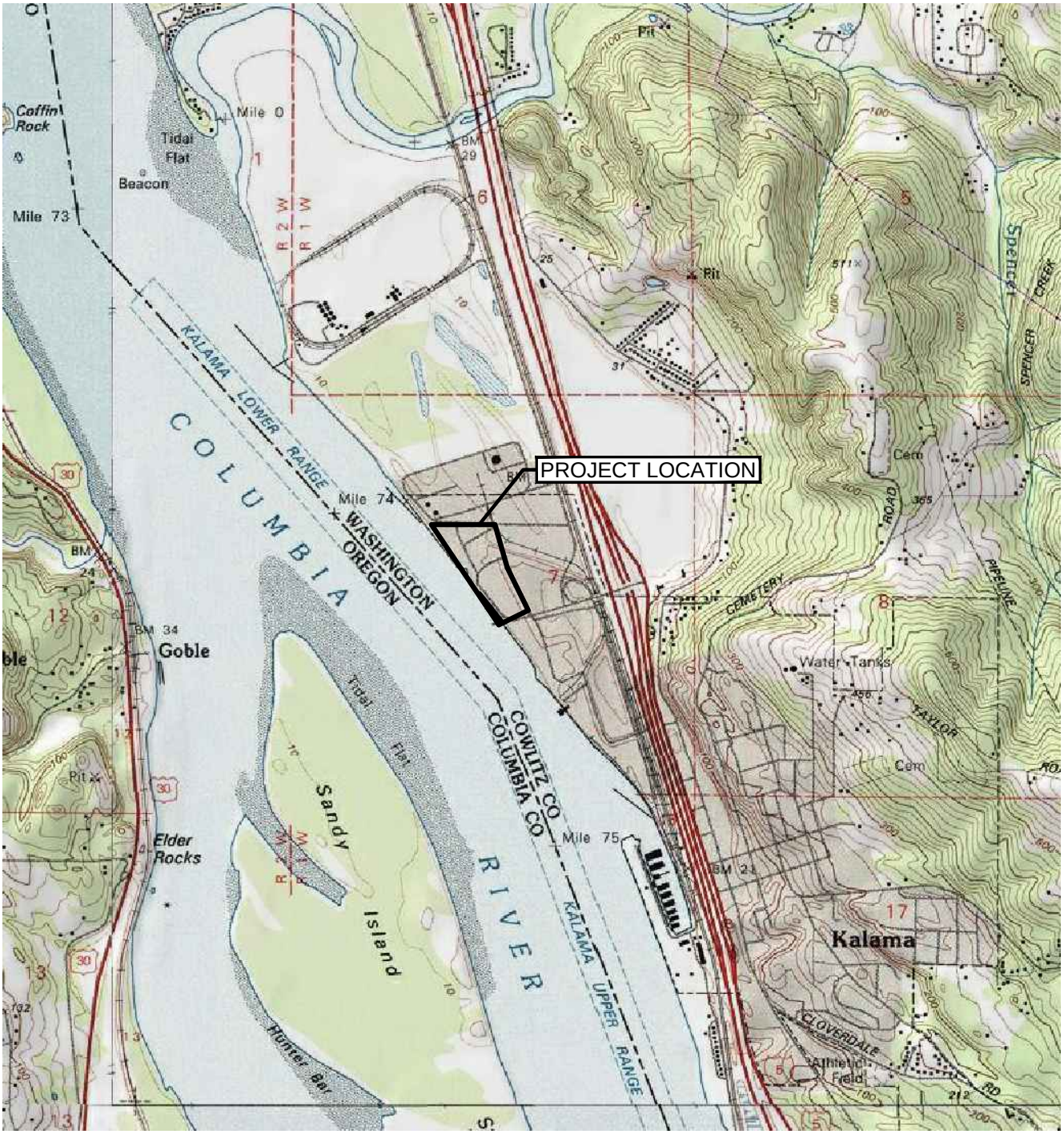
Michael Golden
Project Scientist

Heidi Yantz, LHG
Principal Hydrogeologist

MG/HY/rg

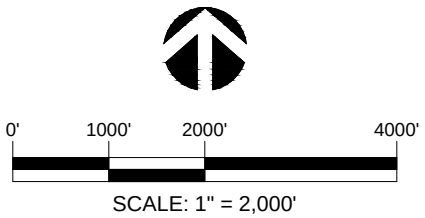


Attachments: Figure 1 – Vicinity Map
Figure 2 – Site Plan
Laboratory Report and Sample Chain-of-Custody Forms
Boring Logs B-1 and B-2
PBS Standard Operating Procedure—Sampling Groundwater Monitoring Wells



SOURCE: USGS KALAMA QUADRANGLE, WA 1990.

WASHINGTON



SCALE: 1" = 2,000'

PREPARED FOR: PORT OF KALAMA

PBS

PROJECT # 20215.003

DATE JAN 2016

VICINITY MAP

NORTHWEST OF FORMER LONGVIEW FIBRE
1253 NORTHWEST 3RD STREET
KALAMA, WASHINGTON

FIGURE 1

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LEGEND

B-1 PUSH PROBE BORING NUMBER AND LOCATION

0' 60' 120' 240'

SCALE: 1" = 120'

PREPARED FOR: PORT OF KALAMA

PBS

PROJECT # 20215.003

DATE JAN 2016

SITE PLAN

NORTHWEST OF FORMER LONGVIEW FIBRE
1253 NORTHWEST 3RD STREET
KALAMA, WASHINGTON

FIGURE 2

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-56103-1
Client Project/Site: Port of Kalama

For:
PBS Engineering and Environmental
4412 SW Corbett Ave
Portland, Oregon 97239

Attn: Mike Golden

Authorized for release by:
12/31/2015 3:18:28 PM

Sarah Murphy, Project Manager I
(253)922-2310
sarah.murphy@testamericainc.com

Table of Contents

Job ID: 580-56103-1

Laboratory: TestAmerica Seattle

Narrative

Receipt
The samples were received on 12/22/2015 4:08 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 9.9º C.

Receipt Exceptions
The following samples was received at the laboratory outside the required temperature criteria: B1-GW (580-56103-1) and B2-GW (580-56103-2). The sample(s) is considered acceptable since it was collected and submitted to the laboratory on the same day and there is evidence that the chilling process has begun.

GC/MS VOA
Method(s) 8260C: The laboratory control sample (LCS) for batch analytical batch 580-208853 recovered outside control limits for the following analytes: isopropylbenzene. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method(s) 8260C: The continuing calibration verification (CCV) associated with batch 580-208853 recovered above the upper control limit for bromomethane, chloroethane, chloromethane, dichlorodifluoromethane, isopropylbenzene, and vinyl chloride. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported. The following samples are impacted: B1-GW (580-56103-1), B2-GW (580-56103-2) and (CCVIS 580-208853/2).

Method(s) NWTPH-Gx: The following sample was collected in a properly preserved vial for analysis of volatile organic compounds (VOCs). However, the pH was outside the required criteria when verified by the laboratory, and corrective action was not possible: B1-GW (580-56103-1). The sample was analyzed within 7 days per EPA recommendation.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

GC Semi VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Organic Prep
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: PBS Engineering and Environmental
Project/Site: Port of Kalama

TestAmerica Job ID: 580-56103-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: B1-GW
Date Collected: 12/22/15 10:15
Date Received: 12/22/15 16:08

Lab Sample ID: 580-56103-1
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.0		ug/L			12/30/15 17:35	1
Chloromethane	ND		5.0		ug/L			12/30/15 17:35	1
Vinyl chloride	ND		1.0		ug/L			12/30/15 17:35	1
Bromomethane	ND		5.0		ug/L			12/30/15 17:35	1
Chloroethane	ND		5.0		ug/L			12/30/15 17:35	1
Trichlorofluoromethane	ND		3.0		ug/L			12/30/15 17:35	1
1,1-Dichloroethene	ND		2.0		ug/L			12/30/15 17:35	1
Methylene Chloride	ND		5.0		ug/L			12/30/15 17:35	1
Methyl tert-butyl ether	ND		1.0		ug/L			12/30/15 17:35	1
trans-1,2-Dichloroethene	ND		1.0		ug/L			12/30/15 17:35	1
1,1-Dichloroethane	ND		2.0		ug/L			12/30/15 17:35	1
2,2-Dichloropropane	ND		3.0		ug/L			12/30/15 17:35	1
cis-1,2-Dichloroethene	ND		1.0		ug/L			12/30/15 17:35	1
Bromochloromethane	ND		2.0		ug/L			12/30/15 17:35	1
Chloroform	ND		1.0		ug/L			12/30/15 17:35	1
1,1,1-Trichloroethane	ND		3.0		ug/L			12/30/15 17:35	1
Carbon tetrachloride	ND		3.0		ug/L			12/30/15 17:35	1
1,1-Dichloropropene	ND		3.0		ug/L			12/30/15 17:35	1
Benzene	ND		2.0		ug/L			12/30/15 17:35	1
1,2-Dichloroethane	ND		1.0		ug/L			12/30/15 17:35	1
Trichloroethene	ND		3.0		ug/L			12/30/15 17:35	1
1,2-Dichloropropane	ND		1.0		ug/L			12/30/15 17:35	1
Dibromomethane	ND		1.0		ug/L			12/30/15 17:35	1
Bromodichloromethane	ND		2.0		ug/L			12/30/15 17:35	1
cis-1,3-Dichloropropene	ND		1.0		ug/L			12/30/15 17:35	1
Toluene	ND		2.0		ug/L			12/30/15 17:35	1
trans-1,3-Dichloropropene	ND		1.0		ug/L			12/30/15 17:35	1
1,1,2-Trichloroethane	ND		1.0		ug/L			12/30/15 17:35	1
Tetrachloroethene	ND		3.0		ug/L			12/30/15 17:35	1
1,3-Dichloropropane	ND		1.0		ug/L			12/30/15 17:35	1
Dibromochloromethane	ND		1.0		ug/L			12/30/15 17:35	1
1,2-Dibromoethane	ND		1.0		ug/L			12/30/15 17:35	1
Chlorobenzene	ND		2.0		ug/L			12/30/15 17:35	1
1,1,1,2-Tetrachloroethane	ND		2.0		ug/L			12/30/15 17:35	1
Ethylbenzene	ND		3.0		ug/L			12/30/15 17:35	1
m-Xylene & p-Xylene	ND		3.0		ug/L			12/30/15 17:35	1
o-Xylene	ND		2.0		ug/L			12/30/15 17:35	1
Styrene	ND		5.0		ug/L			12/30/15 17:35	1
Bromoform	ND		1.0		ug/L			12/30/15 17:35	1
Isopropylbenzene	ND	*	2.0		ug/L			12/30/15 17:35	1
Bromobenzene	ND		2.0		ug/L			12/30/15 17:35	1
1,1,2,2-Tetrachloroethane	ND		1.0		ug/L			12/30/15 17:35	1
1,2,3-Trichloropropane	ND		2.0		ug/L			12/30/15 17:35	1
N-Propylbenzene	ND		3.0		ug/L			12/30/15 17:35	1
2-Chlorotoluene	ND		3.0		ug/L			12/30/15 17:35	1
4-Chlorotoluene	ND		2.0		ug/L			12/30/15 17:35	1
t-Butylbenzene	ND		3.0		ug/L			12/30/15 17:35	1
1,2,4-Trimethylbenzene	ND		3.0		ug/L			12/30/15 17:35	1
sec-Butylbenzene	ND		3.0		ug/L			12/30/15 17:35	1

Client Sample ID: B1-GW
Date Collected: 12/22/15 10:15
Date Received: 12/22/15 16:08

Lab Sample ID: 580-56103-1
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4-Isopropyltoluene	ND		3.0		ug/L			12/30/15 17:35	1
1,3-Dichlorobenzene	ND		2.0		ug/L			12/30/15 17:35	1
1,4-Dichlorobenzene	ND		2.0		ug/L			12/30/15 17:35	1
n-Butylbenzene	ND		3.0		ug/L			12/30/15 17:35	1
1,2-Dichlorobenzene	ND		2.0		ug/L			12/30/15 17:35	1
1,2-Dibromo-3-Chloropropane	ND		2.0		ug/L			12/30/15 17:35	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			12/30/15 17:35	1
Hexachlorobutadiene	ND		2.0		ug/L			12/30/15 17:35	1
Naphthalene	ND		2.0		ug/L			12/30/15 17:35	1
1,2,3-Trichlorobenzene	ND		2.0		ug/L			12/30/15 17:35	1
1,3,5-Trimethylbenzene	ND		3.0		ug/L			12/30/15 17:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*97*		*70 - 136*		*12/30/15 17:35*	*1*
Toluene-d8 (Surr)	*102*		*85 - 120*		*12/30/15 17:35*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*70 - 120*		*12/30/15 17:35*	*1*
4-Bromofluorobenzene (Surr)	*102*		*75 - 120*		*12/30/15 17:35*	*1*
Dibromofluoromethane (Surr)	*90*		*85 - 115*		*12/30/15 17:35*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.050		mg/L			12/24/15 07:23	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*50 - 150*		*12/24/15 07:23*	*1*
Trifluorotoluene (Surr)	*115*		*50 - 150*		*12/24/15 07:23*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.12		mg/L		12/29/15 11:17	12/30/15 21:47	1
Motor Oil (>C24-C36)	ND		0.26		mg/L		12/29/15 11:17	12/30/15 21:47	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*78*		*50 - 150*	*12/29/15 11:17*	*12/30/15 21:47*	*1*

Client Sample ID: B2-GW
Date Collected: 12/22/15 11:25
Date Received: 12/22/15 16:08

Lab Sample ID: 580-56103-2
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.0		ug/L			12/30/15 18:03	1
Chloromethane	ND		5.0		ug/L			12/30/15 18:03	1
Vinyl chloride	ND		1.0		ug/L			12/30/15 18:03	1
Bromomethane	ND		5.0		ug/L			12/30/15 18:03	1
Chloroethane	ND		5.0		ug/L			12/30/15 18:03	1
Trichlorofluoromethane	ND		3.0		ug/L			12/30/15 18:03	1
1,1-Dichloroethene	ND		2.0		ug/L			12/30/15 18:03	1
Methylene Chloride	ND		5.0		ug/L			12/30/15 18:03	1
Methyl tert-butyl ether	ND		1.0		ug/L			12/30/15 18:03	1
trans-1,2-Dichloroethene	ND		1.0		ug/L			12/30/15 18:03	1
1,1-Dichloroethane	ND		2.0		ug/L			12/30/15 18:03	1
2,2-Dichloropropane	ND		3.0		ug/L			12/30/15 18:03	1
cis-1,2-Dichloroethene	ND		1.0		ug/L			12/30/15 18:03	1
Bromochloromethane	ND		2.0		ug/L			12/30/15 18:03	1
Chloroform	ND		1.0		ug/L			12/30/15 18:03	1
1,1,1-Trichloroethane	ND		3.0		ug/L			12/30/15 18:03	1
Carbon tetrachloride	ND		3.0		ug/L			12/30/15 18:03	1
1,1-Dichloropropene	ND		3.0		ug/L			12/30/15 18:03	1
Benzene	ND		2.0		ug/L			12/30/15 18:03	1
1,2-Dichloroethane	ND		1.0		ug/L			12/30/15 18:03	1
Trichloroethene	ND		3.0		ug/L			12/30/15 18:03	1
1,2-Dichloropropane	ND		1.0		ug/L			12/30/15 18:03	1
Dibromomethane	ND		1.0		ug/L			12/30/15 18:03	1
Bromodichloromethane	ND		2.0		ug/L			12/30/15 18:03	1
cis-1,3-Dichloropropene	ND		1.0		ug/L			12/30/15 18:03	1
Toluene	ND		2.0		ug/L			12/30/15 18:03	1
trans-1,3-Dichloropropene	ND		1.0		ug/L			12/30/15 18:03	1
1,1,2-Trichloroethane	ND		1.0		ug/L			12/30/15 18:03	1
Tetrachloroethene	ND		3.0		ug/L			12/30/15 18:03	1
1,3-Dichloropropane	ND		1.0		ug/L			12/30/15 18:03	1
Dibromochloromethane	ND		1.0		ug/L			12/30/15 18:03	1
1,2-Dibromoethane	ND		1.0		ug/L			12/30/15 18:03	1
Chlorobenzene	ND		2.0		ug/L			12/30/15 18:03	1
1,1,1,2-Tetrachloroethane	ND		2.0		ug/L			12/30/15 18:03	1
Ethylbenzene	ND		3.0		ug/L			12/30/15 18:03	1
m-Xylene & p-Xylene	ND		3.0		ug/L			12/30/15 18:03	1
o-Xylene	ND		2.0		ug/L			12/30/15 18:03	1
Styrene	ND		5.0		ug/L			12/30/15 18:03	1
Bromoform	ND		1.0		ug/L			12/30/15 18:03	1
Isopropylbenzene	ND	*	2.0		ug/L			12/30/15 18:03	1
Bromobenzene	ND		2.0		ug/L			12/30/15 18:03	1
1,1,2,2-Tetrachloroethane	ND		1.0		ug/L			12/30/15 18:03	1
1,2,3-Trichloropropane	ND		2.0		ug/L			12/30/15 18:03	1
N-Propylbenzene	ND		3.0		ug/L			12/30/15 18:03	1
2-Chlorotoluene	ND		3.0		ug/L			12/30/15 18:03	1
4-Chlorotoluene	ND		2.0		ug/L			12/30/15 18:03	1
t-Butylbenzene	ND		3.0		ug/L			12/30/15 18:03	1
1,2,4-Trimethylbenzene	ND		3.0		ug/L			12/30/15 18:03	1
sec-Butylbenzene	ND		3.0		ug/L			12/30/15 18:03	1

Client Sample ID: B2-GW
Date Collected: 12/22/15 11:25
Date Received: 12/22/15 16:08

Lab Sample ID: 580-56103-2
Matrix: Water

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
4-Isopropyltoluene	ND		3.0		ug/L			12/30/15 18:03	1
1,3-Dichlorobenzene	ND		2.0		ug/L			12/30/15 18:03	1
1,4-Dichlorobenzene	ND		2.0		ug/L			12/30/15 18:03	1
n-Butylbenzene	ND		3.0		ug/L			12/30/15 18:03	1
1,2-Dichlorobenzene	ND		2.0		ug/L			12/30/15 18:03	1
1,2-Dibromo-3-Chloropropane	ND		2.0		ug/L			12/30/15 18:03	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			12/30/15 18:03	1
Hexachlorobutadiene	ND		2.0		ug/L			12/30/15 18:03	1
Naphthalene	ND		2.0		ug/L			12/30/15 18:03	1
1,2,3-Trichlorobenzene	ND		2.0		ug/L			12/30/15 18:03	1
1,3,5-Trimethylbenzene	ND		3.0		ug/L			12/30/15 18:03	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*98*		*70 - 136*		*12/30/15 18:03*	*1*
Toluene-d8 (Surr)	*102*		*85 - 120*		*12/30/15 18:03*	*1*
1,2-Dichloroethane-d4 (Surr)	*93*		*70 - 120*		*12/30/15 18:03*	*1*
4-Bromofluorobenzene (Surr)	*105*		*75 - 120*		*12/30/15 18:03*	*1*
Dibromofluoromethane (Surr)	*91*		*85 - 115*		*12/30/15 18:03*	*1*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.050		mg/L			12/24/15 07:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*50 - 150*		*12/24/15 07:55*	*1*
Trifluorotoluene (Surr)	*113*		*50 - 150*		*12/24/15 07:55*	*1*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11		mg/L		12/29/15 11:17	12/30/15 22:07	1
Motor Oil (>C24-C36)	ND		0.25		mg/L		12/29/15 11:17	12/30/15 22:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*73*		*50 - 150*	*12/29/15 11:17*	*12/30/15 22:07*	*1*

Method: 8260C - Volatile Organic Compounds by GC/MS

Lab Sample ID: MB 580-208853/4
Matrix: Water
Analysis Batch: 208853

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dichlorodifluoromethane	ND		2.0		ug/L			12/30/15 14:44	1
Chloromethane	ND		5.0		ug/L			12/30/15 14:44	1
Vinyl chloride	ND		1.0		ug/L			12/30/15 14:44	1
Bromomethane	ND		5.0		ug/L			12/30/15 14:44	1
Chloroethane	ND		5.0		ug/L			12/30/15 14:44	1
Trichlorofluoromethane	ND		3.0		ug/L			12/30/15 14:44	1
1,1-Dichloroethene	ND		2.0		ug/L			12/30/15 14:44	1
Methylene Chloride	ND		5.0		ug/L			12/30/15 14:44	1
Methyl tert-butyl ether	ND		1.0		ug/L			12/30/15 14:44	1
trans-1,2-Dichloroethene	ND		1.0		ug/L			12/30/15 14:44	1
1,1-Dichloroethane	ND		2.0		ug/L			12/30/15 14:44	1
2,2-Dichloropropane	ND		3.0		ug/L			12/30/15 14:44	1
cis-1,2-Dichloroethene	ND		1.0		ug/L			12/30/15 14:44	1
Bromochloromethane	ND		2.0		ug/L			12/30/15 14:44	1
Chloroform	ND		1.0		ug/L			12/30/15 14:44	1
1,1,1-Trichloroethane	ND		3.0		ug/L			12/30/15 14:44	1
Carbon tetrachloride	ND		3.0		ug/L			12/30/15 14:44	1
1,1-Dichloropropene	ND		3.0		ug/L			12/30/15 14:44	1
Benzene	ND		2.0		ug/L			12/30/15 14:44	1
1,2-Dichloroethane	ND		1.0		ug/L			12/30/15 14:44	1
Trichloroethene	ND		3.0		ug/L			12/30/15 14:44	1
1,2-Dichloropropane	ND		1.0		ug/L			12/30/15 14:44	1
Dibromomethane	ND		1.0		ug/L			12/30/15 14:44	1
Bromodichloromethane	ND		2.0		ug/L			12/30/15 14:44	1
cis-1,3-Dichloropropene	ND		1.0		ug/L			12/30/15 14:44	1
Toluene	ND		2.0		ug/L			12/30/15 14:44	1
trans-1,3-Dichloropropene	ND		1.0		ug/L			12/30/15 14:44	1
1,1,2-Trichloroethane	ND		1.0		ug/L			12/30/15 14:44	1
Tetrachloroethene	ND		3.0		ug/L			12/30/15 14:44	1
1,3-Dichloropropane	ND		1.0		ug/L			12/30/15 14:44	1
Dibromochloromethane	ND		1.0		ug/L			12/30/15 14:44	1
1,2-Dibromoethane	ND		1.0		ug/L			12/30/15 14:44	1
Chlorobenzene	ND		2.0		ug/L			12/30/15 14:44	1
1,1,1,2-Tetrachloroethane	ND		2.0		ug/L			12/30/15 14:44	1
Ethylbenzene	ND		3.0		ug/L			12/30/15 14:44	1
m-Xylene & p-Xylene	ND		3.0		ug/L			12/30/15 14:44	1
o-Xylene	ND		2.0		ug/L			12/30/15 14:44	1
Styrene	ND		5.0		ug/L			12/30/15 14:44	1
Bromoform	ND		1.0		ug/L			12/30/15 14:44	1
Isopropylbenzene	ND		2.0		ug/L			12/30/15 14:44	1
Bromobenzene	ND		2.0		ug/L			12/30/15 14:44	1
1,1,2,2-Tetrachloroethane	ND		1.0		ug/L			12/30/15 14:44	1
1,2,3-Trichloropropane	ND		2.0		ug/L			12/30/15 14:44	1
N-Propylbenzene	ND		3.0		ug/L			12/30/15 14:44	1
2-Chlorotoluene	ND		3.0		ug/L			12/30/15 14:44	1
4-Chlorotoluene	ND		2.0		ug/L			12/30/15 14:44	1
t-Butylbenzene	ND		3.0		ug/L			12/30/15 14:44	1
1,2,4-Trimethylbenzene	ND		3.0		ug/L			12/30/15 14:44	1

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: MB 580-208853/4
Matrix: Water
Analysis Batch: 208853

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
sec-Butylbenzene	ND		3.0		ug/L			12/30/15 14:44	1
4-Isopropyltoluene	ND		3.0		ug/L			12/30/15 14:44	1
1,3-Dichlorobenzene	ND		2.0		ug/L			12/30/15 14:44	1
1,4-Dichlorobenzene	ND		2.0		ug/L			12/30/15 14:44	1
n-Butylbenzene	ND		3.0		ug/L			12/30/15 14:44	1
1,2-Dichlorobenzene	ND		2.0		ug/L			12/30/15 14:44	1
1,2-Dibromo-3-Chloropropane	ND		2.0		ug/L			12/30/15 14:44	1
1,2,4-Trichlorobenzene	ND		1.0		ug/L			12/30/15 14:44	1
Hexachlorobutadiene	ND		2.0		ug/L			12/30/15 14:44	1
Naphthalene	ND		2.0		ug/L			12/30/15 14:44	1
1,2,3-Trichlorobenzene	ND		2.0		ug/L			12/30/15 14:44	1
1,3,5-Trimethylbenzene	ND		3.0		ug/L			12/30/15 14:44	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Trifluorotoluene (Surr)	*97*		*70 - 136*		*12/30/15 14:44*	*1*
Toluene-d8 (Surr)	*102*		*85 - 120*		*12/30/15 14:44*	*1*
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 120*		*12/30/15 14:44*	*1*
4-Bromofluorobenzene (Surr)	*107*		*75 - 120*		*12/30/15 14:44*	*1*
Dibromofluoromethane (Surr)	*93*		*85 - 115*		*12/30/15 14:44*	*1*

Lab Sample ID: LCS 580-208853/5
Matrix: Water
Analysis Batch: 208853

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Dichlorodifluoromethane	20.0	25.2		ug/L		126	30 - 155
Chloromethane	20.1	24.9		ug/L		124	40 - 125
Vinyl chloride	20.1	27.8		ug/L		138	50 - 145
Bromomethane	20.0	23.6		ug/L		118	30 - 145
Chloroethane	20.1	23.3		ug/L		116	60 - 135
Trichlorofluoromethane	20.0	22.1		ug/L		110	60 - 145
1,1-Dichloroethene	20.2	23.1		ug/L		114	70 - 130
Methylene Chloride	20.1	22.5		ug/L		112	55 - 140
Methyl tert-butyl ether	20.0	19.4		ug/L		97	65 - 125
trans-1,2-Dichloroethene	20.0	24.4		ug/L		122	60 - 140
1,1-Dichloroethane	20.0	23.8		ug/L		119	70 - 135
2,2-Dichloropropane	20.0	26.2		ug/L		131	70 - 135
cis-1,2-Dichloroethene	20.0	22.6		ug/L		113	70 - 125
Bromochloromethane	20.0	19.9		ug/L		99	65 - 130
Chloroform	20.0	22.7		ug/L		114	65 - 135
1,1,1-Trichloroethane	20.1	25.6		ug/L		128	65 - 130
Carbon tetrachloride	20.0	24.9		ug/L		124	65 - 140
1,1-Dichloropropene	20.0	23.0		ug/L		115	75 - 130
Benzene	20.1	23.2		ug/L		116	80 - 120
1,2-Dichloroethane	20.0	20.2		ug/L		101	70 - 130
Trichloroethene	20.0	24.7		ug/L		123	70 - 125
1,2-Dichloropropane	20.0	21.2		ug/L		106	75 - 125
Dibromomethane	20.1	19.7		ug/L		98	75 - 125

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCS 580-208853/5
Matrix: Water
Analysis Batch: 208853

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromodichloromethane	20.1	21.2		ug/L		106	75 - 120
cis-1,3-Dichloropropene	20.1	21.5		ug/L		107	70 - 130
Toluene	20.0	23.6		ug/L		118	75 - 120
trans-1,3-Dichloropropene	20.0	20.2		ug/L		101	55 - 140
1,1,2-Trichloroethane	20.1	18.9		ug/L		94	75 - 125
Tetrachloroethene	20.1	24.8		ug/L		123	45 - 150
1,3-Dichloropropane	20.0	19.1		ug/L		96	75 - 125
Dibromochloromethane	20.0	20.1		ug/L		101	60 - 135
1,2-Dibromoethane	20.0	19.0		ug/L		95	80 - 120
Chlorobenzene	20.1	22.7		ug/L		113	80 - 120
1,1,1,2-Tetrachloroethane	20.1	22.0		ug/L		110	80 - 130
Ethylbenzene	20.1	23.3		ug/L		116	75 - 125
m-Xylene & p-Xylene	20.0	22.9		ug/L		114	75 - 130
o-Xylene	20.0	23.9		ug/L		119	80 - 120
Styrene	20.0	23.0		ug/L		115	65 - 135
Bromoform	20.1	16.7		ug/L		83	70 - 130
Isopropylbenzene	20.0	25.2	*	ug/L		126	75 - 125
Bromobenzene	20.0	22.1		ug/L		111	75 - 125
1,1,2,2-Tetrachloroethane	20.0	17.0		ug/L		85	65 - 130
1,2,3-Trichloropropane	20.0	16.9		ug/L		85	75 - 125
N-Propylbenzene	20.0	23.7		ug/L		118	70 - 130
2-Chlorotoluene	20.0	23.5		ug/L		118	75 - 125
4-Chlorotoluene	20.1	23.4		ug/L		117	75 - 130
t-Butylbenzene	20.0	26.0		ug/L		130	70 - 130
1,2,4-Trimethylbenzene	20.0	24.8		ug/L		124	75 - 130
sec-Butylbenzene	20.0	23.2		ug/L		116	70 - 125
4-Isopropyltoluene	20.0	26.1		ug/L		130	75 - 130
1,3-Dichlorobenzene	20.0	23.0		ug/L		115	75 - 125
1,4-Dichlorobenzene	20.1	22.4		ug/L		112	75 - 125
n-Butylbenzene	20.0	25.4		ug/L		127	70 - 135
1,2-Dichlorobenzene	20.0	21.2		ug/L		106	70 - 120
1,2-Dibromo-3-Chloropropane	20.0	16.1		ug/L		80	50 - 130
1,2,4-Trichlorobenzene	20.0	22.1		ug/L		111	65 - 135
Hexachlorobutadiene	20.0	26.7		ug/L		133	50 - 140
Naphthalene	20.0	18.6		ug/L		93	55 - 140
1,2,3-Trichlorobenzene	20.0	20.4		ug/L		102	55 - 140
1,3,5-Trimethylbenzene	20.0	25.6		ug/L		128	75 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
Trifluorotoluene (Surr)	*100*		*70 - 136*
Toluene-d8 (Surr)	*102*		*85 - 120*
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 120*
4-Bromofluorobenzene (Surr)	*102*		*75 - 120*
Dibromofluoromethane (Surr)	*97*		*85 - 115*

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-208853/6
Matrix: Water
Analysis Batch: 208853

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Dichlorodifluoromethane	20.0	23.4		ug/L		117	30 - 155	7	30
Chloromethane	20.1	22.8		ug/L		114	40 - 125	9	30
Vinyl chloride	20.1	25.9		ug/L		128	50 - 145	7	30
Bromomethane	20.0	22.2		ug/L		111	30 - 145	6	30
Chloroethane	20.1	21.8		ug/L		109	60 - 135	7	30
Trichlorofluoromethane	20.0	21.8		ug/L		109	60 - 145	1	30
1,1-Dichloroethene	20.2	22.0		ug/L		109	70 - 130	5	30
Methylene Chloride	20.1	21.7		ug/L		108	55 - 140	4	30
Methyl tert-butyl ether	20.0	20.2		ug/L		101	65 - 125	4	30
trans-1,2-Dichloroethene	20.0	23.4		ug/L		117	60 - 140	4	30
1,1-Dichloroethane	20.0	23.1		ug/L		115	70 - 135	3	30
2,2-Dichloropropane	20.0	25.4		ug/L		127	70 - 135	3	30
cis-1,2-Dichloroethene	20.0	22.0		ug/L		110	70 - 125	3	30
Bromochloromethane	20.0	20.4		ug/L		102	65 - 130	3	30
Chloroform	20.0	22.6		ug/L		113	65 - 135	0	30
1,1,1-Trichloroethane	20.1	24.9		ug/L		124	65 - 130	3	30
Carbon tetrachloride	20.0	24.1		ug/L		120	65 - 140	3	30
1,1-Dichloropropene	20.0	22.2		ug/L		111	75 - 130	3	30
Benzene	20.1	22.5		ug/L		112	80 - 120	3	30
1,2-Dichloroethane	20.0	20.2		ug/L		101	70 - 130	0	30
Trichloroethene	20.0	23.6		ug/L		118	70 - 125	5	30
1,2-Dichloropropane	20.0	21.1		ug/L		105	75 - 125	1	30
Dibromomethane	20.1	20.4		ug/L		102	75 - 125	4	30
Bromodichloromethane	20.1	21.7		ug/L		108	75 - 120	2	30
cis-1,3-Dichloropropene	20.1	21.5		ug/L		107	70 - 130	0	30
Toluene	20.0	22.9		ug/L		115	75 - 120	3	30
trans-1,3-Dichloropropene	20.0	20.9		ug/L		104	55 - 140	3	30
1,1,2-Trichloroethane	20.1	19.5		ug/L		97	75 - 125	3	30
Tetrachloroethene	20.1	23.4		ug/L		117	45 - 150	6	30
1,3-Dichloropropane	20.0	19.6		ug/L		98	75 - 125	2	30
Dibromochloromethane	20.0	20.6		ug/L		103	60 - 135	2	30
1,2-Dibromoethane	20.0	19.6		ug/L		98	80 - 120	3	30
Chlorobenzene	20.1	22.5		ug/L		112	80 - 120	1	30
1,1,1,2-Tetrachloroethane	20.1	22.1		ug/L		110	80 - 130	0	30
Ethylbenzene	20.1	22.7		ug/L		113	75 - 125	3	30
m-Xylene & p-Xylene	20.0	22.5		ug/L		112	75 - 130	2	30
o-Xylene	20.0	23.4		ug/L		117	80 - 120	2	30
Styrene	20.0	22.9		ug/L		114	65 - 135	1	30
Bromoform	20.1	18.0		ug/L		89	70 - 130	7	30
Isopropylbenzene	20.0	24.6		ug/L		123	75 - 125	2	30
Bromobenzene	20.0	21.2		ug/L		106	75 - 125	4	30
1,1,2,2-Tetrachloroethane	20.0	17.6		ug/L		88	65 - 130	3	30
1,2,3-Trichloropropane	20.0	17.4		ug/L		87	75 - 125	3	30
N-Propylbenzene	20.0	22.2		ug/L		111	70 - 130	7	30
2-Chlorotoluene	20.0	22.4		ug/L		112	75 - 125	5	30
4-Chlorotoluene	20.1	22.4		ug/L		112	75 - 130	4	30
t-Butylbenzene	20.0	24.4		ug/L		122	70 - 130	6	30
1,2,4-Trimethylbenzene	20.0	23.7		ug/L		119	75 - 130	4	30

Method: 8260C - Volatile Organic Compounds by GC/MS (Continued)

Lab Sample ID: LCSD 580-208853/6
Matrix: Water
Analysis Batch: 208853

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
sec-Butylbenzene			20.0	22.1		ug/L		110	70 - 125	5	30
4-Isopropyltoluene			20.0	24.6		ug/L		123	75 - 130	6	30
1,3-Dichlorobenzene			20.0	22.3		ug/L		111	75 - 125	3	30
1,4-Dichlorobenzene			20.1	21.6		ug/L		108	75 - 125	4	30
n-Butylbenzene			20.0	24.5		ug/L		122	70 - 135	4	30
1,2-Dichlorobenzene			20.0	21.0		ug/L		105	70 - 120	1	30
1,2-Dibromo-3-Chloropropane			20.0	17.6		ug/L		88	50 - 130	9	30
1,2,4-Trichlorobenzene			20.0	22.5		ug/L		113	65 - 135	2	30
Hexachlorobutadiene			20.0	26.1		ug/L		131	50 - 140	2	30
Naphthalene			20.0	20.1		ug/L		100	55 - 140	8	30
1,2,3-Trichlorobenzene			20.0	21.4		ug/L		107	55 - 140	4	30
1,3,5-Trimethylbenzene			20.0	24.3		ug/L		121	75 - 130	5	30

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*99*		*70 - 136*
Toluene-d8 (Surr)	*101*		*85 - 120*
1,2-Dichloroethane-d4 (Surr)	*97*		*70 - 120*
4-Bromofluorobenzene (Surr)	*105*		*75 - 120*
Dibromofluoromethane (Surr)	*98*		*85 - 115*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-208576/5
Matrix: Water
Analysis Batch: 208576

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Gasoline	ND		0.050		mg/L			12/24/15 05:15	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*50 - 150*		*12/24/15 05:15*	*1*
Trifluorotoluene (Surr)	*114*		*50 - 150*		*12/24/15 05:15*	*1*

Lab Sample ID: LCS 580-208576/6
Matrix: Water
Analysis Batch: 208576

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Gasoline			1.16	1.07		mg/L		92	79 - 110		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*50 - 150*
Trifluorotoluene (Surr)	*118*		*50 - 150*

Method: NWTPH-Gx - Northwest - Volatile Petroleum Products (GC) (Continued)

Lab Sample ID: LCSD 580-208576/7
Matrix: Water
Analysis Batch: 208576

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Gasoline			1.16	1.08		mg/L		93	79 - 110	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*108*		*50 - 150*
Trifluorotoluene (Surr)	*118*		*50 - 150*

Method: NWTPH-Dx - Northwest - Semi-Volatile Petroleum Products (GC)

Lab Sample ID: MB 580-208701/1-B
Matrix: Water
Analysis Batch: 208857

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 208701

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
#2 Diesel (C10-C24)	ND		0.11		mg/L		12/29/15 11:17	12/30/15 20:27	1
Motor Oil (>C24-C36)	ND		0.25		mg/L		12/29/15 11:17	12/30/15 20:27	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*86*		*50 - 150*	*12/29/15 11:17*	*12/30/15 20:27*	*1*

Lab Sample ID: LCS 580-208701/2-B
Matrix: Water
Analysis Batch: 208857

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 208701

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
#2 Diesel (C10-C24)			2.00	1.89		mg/L		94	59 - 120
Motor Oil (>C24-C36)			2.01	2.00		mg/L		100	71 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*84*		*50 - 150*

Lab Sample ID: LCSD 580-208701/3-B
Matrix: Water
Analysis Batch: 208857

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 208701

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
#2 Diesel (C10-C24)			2.00	1.81		mg/L		90	59 - 120	5	27
Motor Oil (>C24-C36)			2.01	1.86		mg/L		93	71 - 140	8	27

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*80*		*50 - 150*

Lab Chronicle

Client: PBS Engineering and Environmental
Project/Site: Port of Kalama

TestAmerica Job ID: 580-56103-1

Client Sample ID: B1-GW

Lab Sample ID: 580-56103-1

Date Collected: 12/22/15 10:15

Matrix: Water

Date Received: 12/22/15 16:08

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	208853	12/30/15 17:35	IWH	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	208576	12/24/15 07:23	D1R	TAL SEA
Total/NA	Prep	3510C			208701	12/29/15 11:17	RBL	TAL SEA
Total/NA	Cleanup	3630C			208733	12/29/15 14:23	RBL	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	208857	12/30/15 21:47	NMI	TAL SEA

Client Sample ID: B2-GW

Lab Sample ID: 580-56103-2

Date Collected: 12/22/15 11:25

Matrix: Water

Date Received: 12/22/15 16:08

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260C		1	208853	12/30/15 18:03	IWH	TAL SEA
Total/NA	Analysis	NWTPH-Gx		1	208576	12/24/15 07:55	D1R	TAL SEA
Total/NA	Prep	3510C			208701	12/29/15 11:17	RBL	TAL SEA
Total/NA	Cleanup	3630C			208733	12/29/15 14:23	RBL	TAL SEA
Total/NA	Analysis	NWTPH-Dx		1	208857	12/30/15 22:07	NMI	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: PBS Engineering and Environmental
Project/Site: Port of Kalama

TestAmerica Job ID: 580-56103-1

Laboratory: TestAmerica Seattle

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-16
California	State Program	9	2901	01-31-17
L-A-B	DoD ELAP		L2236	01-19-16
L-A-B	ISO/IEC 17025		L2236	01-19-16
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-06-16
US Fish & Wildlife	Federal		LE058448-0	02-28-16
USDA	Federal		P330-14-00126	04-08-17
Washington	State Program	10	C553	02-17-16

Sample Summary

Client: PBS Engineering and Environmental
Project/Site: Port of Kalama

TestAmerica Job ID: 580-56103-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-56103-1	B1-GW	Water	12/22/15 10:15	12/22/15 16:08
580-56103-2	B2-GW	Water	12/22/15 11:25	12/22/15 16:08

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Phone (253) 922-2310 Fax (253) 922-5047

Chain of Custody Record

580-56103 Chain of Custody

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Mike Golden	Lab PM: Murphy, Sarah A	C No: 0-17924-6215.1
Client Contact: ~~Marsha Walker~~ MG Mike Golden	Phone: 503-248-1939	E-Mail: sarah.murphy@testamericainc.com	Page: Page 1 of 1
Company: PBS Engineering and Environmental			Job #:
Address: 4412 SW Corbett Ave	Due Date Requested:		
City: Portland	TAT Requested (days): STANDARD 5-DAY TAT		
State, Zip: OR, 97239			
Phone: 503-248-1939	PO #: Purchase Order not required		
Email: mike.golden ~~Marsha.walker@pbsenv.com~~	WO #:		
Project Name: MG ~~General - Water~~ PORT OF KALAMA	Project #: ~~58008504~~ 20215.003		
Site:	SSOW#:		

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8270C_SIM - Standard PAH Reporting List	NWTPH_Dx - Standard reporting list for NWTPH-Dx	VOCs 8260B (3 WKS)	NWTPH-Gx (6 WKS)	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N	A	A	A		
B1-GW	12/22/15	1015	G	Water			~~MG~~	X	X	X		PAH maybe requested pending Dx results
B2-GW	12/22/15	1125	G	Water				X	X	X		
				Water								
				Water								

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by:	Date/Time: 12/22/15 1608	Company PBS	Received by:	Date/Time: 12/22/15 @ 1608	Company TAL
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks: 9.9 IR/G-L

12/31/2015

Login Sample Receipt Checklist

Client: PBS Engineering and Environmental

Job Number: 580-56103-1

Login Number: 56103
List Number: 1
Creator: Svabik-Seror, Philip M

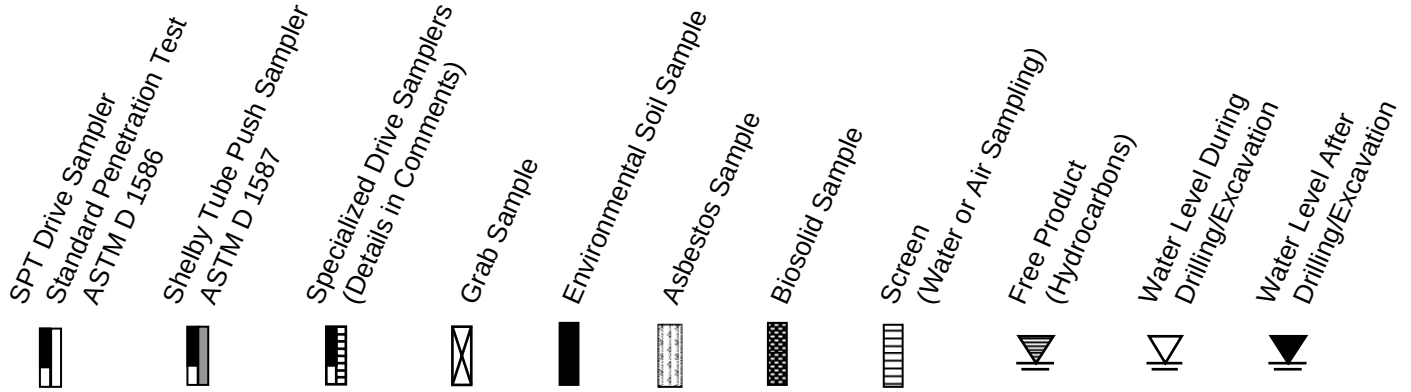
List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	False	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	N/A	
Samples do not require splitting or compositing.	N/A	
Residual Chlorine Checked.	N/A	

PBS Engineering + Environmental

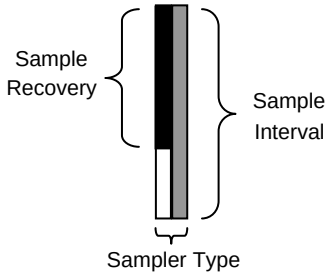
Key To Test Pit and Boring Log Symbols

SAMPLING DESCRIPTIONS

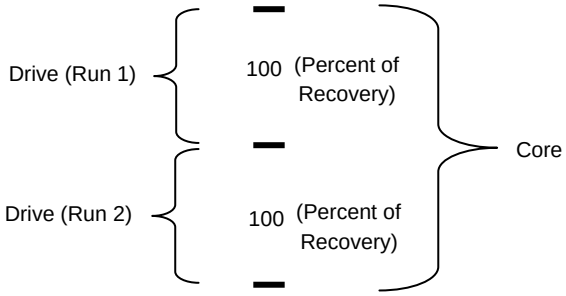


LOG GRAPHICS

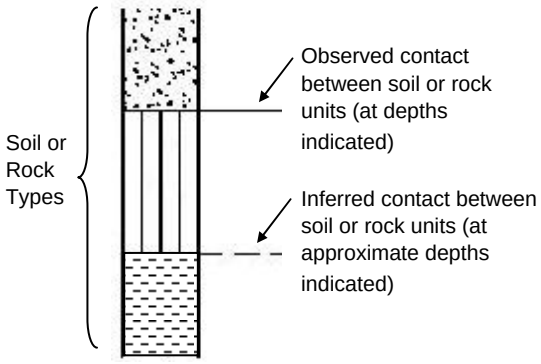
Sampling Symbols



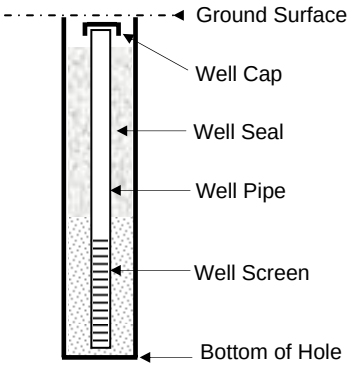
Direct Push, Geoprobe®, Sonic, Vibracore Drilling



Soil and Rock



Well Detail



ENVIRONMENTAL TESTING EXPLANATIONS

ATD	At Time of Drilling	PPM	Parts Per Million
BGS	Below Ground Surface	VOC	Volatile Organic Compounds
MSL	Mean Sea Level	ND	Not Detected
MW	Monitoring Well (Water Sampling)	NS	No Sheen
NWTPH-Gx	Gasoline-Range Petroleum Hydrocarbon Testing	SS	Slight Sheen
OD	Outside Diameter	MS	Moderate Sheen
PID	Photoionization Detector Headspace Analysis	HS	High Sheen

PBS Engineering + Environmental
4412 SW Corbett Avenue
Portland, Oregon 97239
Phone: 503.248.1939
Fax: 866.727.0140

PORT OF KALAMA
1253 NW 3RD
KALAMA, WASHINGTON

PBS PROJECT NUMBER:
20215.003

BORING B-1

BORING B-1 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Very dense dark brown and black GRAVEL (GP-GM) with silt; non-plastic; coarse, angular gravel; wet		0.0				Some wood debris mixed in with upper 2 feet
		FILL						
2.0		grades to dry to damp					75	Slight marshy odor throughout boring
4.0								
		Loose light brown and light gray SAND (SP); fine sand; damp		0.0				
6.0			▼					
							75	
8.0								
		Soft gray SILT (ML); non-plastic; damp to moist						
		Loose gray SAND (SP); fine sand; damp to moist	ATD ▽					
10.0				0.0				
		Very loose gray to light gray SAND (SW-SM) with silt; non-plastic; fine to medium sand; wet			B1-GW			
12.0							100	
14.0								
		Final boring depth 15.0 feet bgs; boring backfilled with bentonite.						
16.0								
18.0								
20.0								

BORING METHOD: Push Probe
DRILLED BY: Pacific Soil & Water, LLC
BORING BIT DIAMETER: 2¼-inch OD

LOGGED BY: M. Golden
COMPLETED: 12/22/16

PBS Engineering + Environmental
4412 SW Corbett Avenue
Portland, Oregon 97239
Phone: 503.248.1939
Fax: 866.727.0140

PORT OF KALAMA
1253 NW 3RD
KALAMA, WASHINGTON

PBS PROJECT NUMBER:
20215.003

BORING B-2

BORING B-2 LOCATION:
(See Site Plan)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION	GROUND-WATER	PID (PPM)	SAMPLE NUMBER	SAMPLE/ TEMPORARY WELL(S)	RECOVERY (%)	COMMENTS/ WELL INSTALLATION
0.0		Very dense dark brown and black GRAVEL (GP-GM) with silt; non-plastic; coarse, angular gravel; wet		0.0				
		FILL						
2.0		grades to dry to damp					75	Slight marshy odor throughout boring
4.0			▼	0.0				
		Loose light brown and light gray SAND (SP); fine sand; damp						
6.0			ATD ▽					
		grades to wet					100	
8.0								
		Soft gray SILT (ML); non-plastic; wet						
		Loose gray SAND (SP); fine sand; wet						
10.0		Very loose gray to light gray SAND (SW-SM) with silt; non-plastic; fine to medium sand; wet		0.0	B2-GW			
12.0							100	
14.0								
		Final boring depth 15.0 feet bgs; boring backfilled with bentonite.						
16.0								
18.0								
20.0								

BORING METHOD: Push Probe
DRILLED BY: Pacific Soil & Water, LLC
BORING BIT DIAMETER: 2¼-inch OD

LOGGED BY: M. Golden
COMPLETED: 12/22/16

PBS | Engineering + Environmental

STANDARD OPERATING PROCEDURE
SAMPLING GROUNDWATER MONITORING WELLS

1.0 BACKGROUND AND PURPOSE

Groundwater samples are collected from monitoring wells for analysis of physical and chemical parameters, either by using field observations and portable equipment and/or using established laboratory analytical methods. The goal of this process is to obtain groundwater samples that are representative of the aquifer (i.e., avoiding a sample that has been impacted by surface or atmospheric conditions). Current sampling techniques focus on minimizing purged water while providing representative samples.

Low-flow purging and sampling methods were developed to minimize purge water volume and reduce the potential for contaminant volatilization. Low-flow techniques have become the industry standard for collecting a groundwater sample because the method minimizes turbidity and produces a more representative groundwater sample. Low-flow techniques include the use of pumps dedicated to specific wells or the use of a portable pump system. Alternatively, there are emerging sampling techniques that focus on installing a collection vessel within the well prior to the sample collection event, and allowing the water column within the well to equilibrate with the aquifer prior to retrieving the sample. The appropriate technique is dependent on project-specific goals and data quality requirements. Sampling methodology should be confirmed with the PBS project manager prior to preparing for groundwater monitoring.

The procedures in this Standard Operating Procedure (SOP) are specific to standard monitoring wells with a single-slotted interval. It is assumed the low-flow purging and sampling protocols are used, although these protocols can be adjusted for most sampling methods. Temporary borings advanced for a single field event may be sampled using the techniques presented in this SOP.

2.0 EQUIPMENT AND SUPPLY LIST

- Well lock keys
- Groundwater Sampling Field Form
- Depth to Groundwater Field Form
- Copies of field forms and data tables from previous groundwater monitoring event
- Electronic water level probe or interface probe (if dense or light non-aqueous phase liquids are [DNAPL or LNAPL] is present)
- Tubing cutters, knife or scissors (note: some sites do not allow the use of a knife on-site)
- Decontamination equipment
- Measuring cup
- Safety cones
- Bolt cutters
- Replacement well caps, bolts, and padlocks
- Small cup or turkey baster to purge standing water inside well monument
- Fish hooks, stainless steel weight, and fishing line to retrieve objects in the well

- Site map and health and safety plan
- Personal protection equipment (PPE) required for the site, including nitrile gloves (confirm with site-specific health and safety plan)
- Submersible pump or peristaltic pump and associated equipment
- Compressed gas source (nitrogen or air compressor), battery source, or generator and fuel
- Control box
- Disposable tubing, if necessary
- Flow-through cell and water quality parameter meter (e.g. YSI model)
- Buckets or containers for purge water and drum labels
- Sample containers, labels, packaging material
- Coolers and ice for samples

3.0 PROCEDURE

Preparation for a monitoring event begins in the office. The first step is to read the scope of work (e.g., proposal, sampling and analysis plan (SAP), work plan) to determine the number and location of monitoring wells to be sampled, health and safety considerations, quality control (QC) samples needed, sample containers required, and equipment needed for the site (peristaltic pump, bladder pump, both, etc.). Recommended preplanning procedures are as follows:

1. Prepare, review, or update Health and Safety Plan (HASP) for the site
2. Obtain appropriate PPE for the site (e.g., hard hat, safety vest, gloves, safety glasses, life vest, flame retardant [FR] shirt or other client-required PPE)
3. Determine number and type of samples to be collected
4. Determine which laboratory can meet analytical requirements (required analysis, screening levels)
5. Order sample containers from laboratory, making sure to order QC sample containers and at least one extra set of containers. Ensure that a Safety Data Sheet (SDS) is provided for any sample preservative supplied by the laboratory.
6. Print all forms needed for sampling event (work plan, HASP, depth to water forms, groundwater sampling forms, labels, chain of custody, etc.)
7. Schedule PBS equipment use on an equipment calendar, as warranted
8. Order rental equipment for sampling event, if not available internally

After arriving at the site, the following procedure should be followed:

1. Don appropriate PPE and place safety cones around the work zone, if required by the HASP or deemed necessary by site conditions.
2. Open all the monitoring wells on-site and wait a minimum of 15 minutes for water levels to approach an equilibrium state with atmospheric pressure before taking any measurements.
3. Note the general condition of the well on the depth to groundwater field form. Check well for damage or evidence of tampering, and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.
4. Collect depth to water measurements from each monitoring well, decontaminating the probe between locations. If possible, gauging should be conducted in order from the least to the most contaminated well. The measurements should be collected from all wells prior to beginning sample collection, unless project scope or site conditions indicate otherwise.
5. Measure the depth to water relative to the marking on the well casings. If there is no mark, use the north side of the casing. Record the water level on the depth to groundwater field form. Note if DNAPL or LNAPL is present (this typically requires a meter capable of

detecting NAPL-water interfaces). If NAPL is present, additional decontamination procedures will be warranted.
6. Measure depth to bottom of well to record if sedimentation in the well has occurred.
7. Make sure all information is completed on the depth to groundwater field form and sign and date it.

Sampling a groundwater monitoring well utilizing low-flow techniques relies on stabilization of field water quality parameters to determine when groundwater is representative of aquifer conditions. Measurement of groundwater quality parameters with a water quality parameter meter occurs in a closed system in which groundwater does not come in contact with open air; this is important for valid measurements because dissolved oxygen (DO), oxidation-reduction potential (ORP), and pH measurements can be sensitive to reactions with the atmosphere. A flow-through cell (flow cell) connected to the water quality parameter meter provides this closed system and is used to measure field parameters prior to collecting groundwater samples. Stabilization of selected parameters indicates that conditions are suitable for sampling to begin. See protocol below for stabilization parameters.

Low-flow purge and sample methods require care when placing a portable pump and/or tubing in the well to minimize disturbance to the water column. Pumping rates must be maintained at 0.1 to 0.5 liter per minute to reduce drawdown; the pump should never be run higher than 0.5 liters per minute prior to sampling.

For monitoring wells, sampling should proceed as follows:

1. If using a portable pump setup, slowly lower the pump or tubing to the midpoint of the screen or sample interval. Secure the pump or tubing at the surface to prevent it from moving (not applicable if using dedicated pumps).
2. Connect the bladder pump (attaching control box, compressor or nitrogen tank with regulator) or peristaltic pump to flow cell containing water quality parameter probes. Place the water level probe in the well so water levels can be measured as you are pumping. Start the pump and adjust the pumping rate to between 0.1 and 0.5 liters per minute (using a measuring cup to calculate the flow rate). Begin recording readings on the groundwater sampling field form. Be sure to purge the initial volume of water in tubing before taking a reading.
3. During purging, record readings of groundwater parameters (listed below) and water level every 3 to 5 minutes on the groundwater sampling field form. A drawdown of less than 0.3 feet in the water column, once the pumping rate has stabilized, is desirable; however, less permeable aquifer material or a clogged well filter pack may result in a deeper drawdown. At a minimum, the depth-to-water should be stabilized for three consecutive readings taken between 3 to 5 minutes apart (in conjunction with the stabilization of the other parameters). Visually describe turbidity. Purging is considered complete when the groundwater parameters have stabilized for three consecutive readings.

Field Parameter	**Stabilization Goal**
Temperature	+/- 3%
Specific conductance	+/- 3% mS/cm
pH	+/- 0.1 pH units
DO	+/- 10% *or* +/- 0.3 mg/L
ORP	+/- 10 millivolts
Depth to Water	+/- 0.3 feet

Please note that multi-parameter meters may have a resolution greater than the stabilization goal. Note the meter capabilities. If the field parameters do not stabilize within the stabilization goal, but are within the resolution of the meter, it may be acceptable to collect a sample in this scenario. This MUST be noted on the field form.

4. Measure turbidity of the sample water using field instruments prior to sample collection and upon any obvious visual changes in turbidity during sample collection.
5. Prior to collecting the water sample, the tubing originating in the well must be disconnected from the influent (inflow) side of the flow cell.
6. Directly fill the sample containers from the tubing originating in the well. If you are collecting samples for volatile organic compound (VOC) analysis, you may need to decrease the pump rate to minimize volatilization of compounds from the sample; if this is the case, other samples should be collected first. You may restore the flow rate upon completion of filling sample containers for VOC analysis. Fill unpreserved bottles first. Filtered samples should be collected after all other samples have been collected.
7. If a duplicate sample is required for the well, it should be filled concurrently with the regular sample. This is accomplished by alternating bottles of the same type during sample collection (e.g., filling one bottle from each sample, then the second bottle from each sample.)
8. Groundwater samples for dissolved metals analysis must be field filtered with a 0.45 micron filter directly connected to the tubing. Mark “field filtered” or “FF” on the bottle label, field form, and chain of custody.
9. Prior to filling or just after filling, label each bottle with the project name, sample name, and sample date and time, and make sure it is properly sealed. The sample containers may also be labeled with what analysis will be performed (confirm with Project Manager). Place in a cooler with ice and pack for transportation.
10. As necessary, pull pump and discard tubing. Decontaminate the pump based on the decontamination procedures established for the site.
11. Make sure all information is completed on the groundwater field form and sign and date it.
12. Close and lock the well.
13. Contain purge and decontamination water in the appropriate containers as established for the project.
14. Dispose of used sampling supplies and other waste in appropriate container as established for the project.

If low-flow sampling is not used at the site, these procedures should be modified as appropriate. The objective is to provide high-quality groundwater samples representative of the aquifer. Modifications to this SOP should keep this objective in mind at all times.

After fieldwork is completed:

- Ensure that chain-of-custody form has necessary information including site name, project manager, sample names, date and time collected, requested analysis, special notes (field filtered, MS/MSD, etc.).
- Scan and save field sheets to project folder on server. Retain original field copies in project folder; these are legal documents and should be retained as per PBS guidelines for document retention.
- Report any sampling or well maintenance issues to the project manager for evaluation and remedy.

- Clean and store PBS equipment for use on next project. Report any equipment damage or malfunctions or missing/depleted calibration solutions to the office equipment manager.
- Ship rental equipment back to vendor immediately to minimize project costs.

References:

Puls, R.W. and M.J. Barcelona, 1996, GROUNDWATER ISSUE PAPER: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures; U.S. Environmental Protection Agency, EPA/540/S-95/504.

Yeskis, D. and Bernard Zavala, GROUNDWATER ISSUE PAPER: Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers, U.S. Environmental Protection Agency, EPA 542-S-02-001, May 2002.